

# Potential Economic Contributions of a University of Missouri School of Medicine Class Size Increase and Development of a Clinical Campus in Springfield

Prepared by Thomas Johnson, PhD  
James Rossi, Bhawani Mishra and Shriniwas Gautam  
Community Policy Analysis Center (CPAC)



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School of Medicine  
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# Potential Economic Contribution of a University of Missouri School of Medicine Class Size Increase and Development of a Clinical Campus in Springfield

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CPAC

## 1-Executive Summary

- The construction phase of the medical school expansion in Columbia and the clinical campus in Springfield are expected to have a total economic impact of \$56.5 million for Missouri. This gross sales total includes increasing the gross domestic product (GDP) by \$27 million and labor income by \$20.6 million. In addition, the program will create 475.9 jobs throughout the duration of the construction.
- When the program reaches its full effect (after 27 years) the total economic impact on the Missouri economy of the new educational program, student spending and additional physicians in the state are predicted to be more than \$390 million. This gross sales total includes increasing the state's gross domestic product by \$240 million, and generating more than \$190 million in additional annual income to Missouri workers. In addition, the program will have added 3,500 jobs to the state economy.
- The operating phase of the project is expected to have an annual economic impact of \$17.6 million. This gross sales total includes annually increasing statewide GDP by \$12.2 million and labor income by \$10.3 million. In addition, employment will increase by 203.4 jobs as a result of operations.
- The students' spending on room and board, class materials and insurance is expected to have a total economic impact of \$2.8 million. This gross sales total includes increasing GDP by \$1.6 million and labor income by \$942,000. In addition, employment will increase by 25.8 jobs as a result of student spending.
- The program is expected to contribute 51 medical residents and 27 physicians to the Southwest Missouri region by the 10th year of operation, increasing to 192 physicians by the 20th year. When the program is fully effective after 27 years, it is expected to increase the number of physicians in the Southwest Missouri region by 315.
- When fully effective after 27 years, the program will have a total economic impact of \$327 million on Southwest Missouri. This gross sales total includes increasing GDP by \$210 million and labor income by \$165 million. In addition, employment will increase by 3,004 jobs in Southwest Missouri.
- These economic benefits do not include other community benefits resulting from the increased supply of physicians, such as reduced travel costs or improved community health.
- These estimates assume that new physicians to the region do not displace gross revenues to existing physicians or reduce the numbers of physicians that would have located in the region otherwise.

The following table describes the total economic impact of the clinical campus' operations when it reaches its full effect, after 27 years. The table does not include the additional economic impact resulting from construction.

**Potential Economic Contribution of a University of Missouri School of Medicine Class Size  
Increase and Development of a Clinical Campus in Springfield**

<b>Impact</b>	<b>Mid-Missouri</b>	<b>Southwest Missouri</b>	<b>Statewide</b>
<b>Gross Sales</b>			
Operating	\$11,555,080	\$4,902,120	\$17,610,351
Student Spending	\$1,203,749	\$1,205,575	\$2,838,165
New Physician Impact		\$327,297,576	\$369,885,503
<b>TOTAL</b>	<b>\$12,758,829</b>	<b>\$333,405,271</b>	<b>\$390,334,019</b>
<b>GDP</b>			
Operating	\$7,587,683	\$3,977,457	\$12,242,857
Student Spending	\$651,341	\$650,853	\$1,574,189
New Physician Impact		\$209,974,472	\$233,463,675
<b>TOTAL</b>	<b>\$8,239,024</b>	<b>\$214,602,782</b>	<b>\$247,280,721</b>
<b>Labor Income</b>			
Operating	\$6,385,179	\$3,504,753	\$10,343,594
Student Spending	\$379,624	\$380,203	\$941,682
New Physician Impact		\$164,907,913	\$179,167,743
<b>TOTAL</b>	<b>\$6,764,803</b>	<b>\$168,792,869</b>	<b>\$190,453,019</b>
<b>Employment</b>			
Operating	92.8	105.2	203.4
Student Spending	11.7	12.2	25.8
New Physician Impact		3,004	3,270
<b>TOTAL</b>	<b>105</b>	<b>3,121</b>	<b>3,499</b>

## 2-Introduction

**Studies increasingly point to a health care crisis related to physician shortages in Missouri and across the nation. Currently:**

- Nearly 90 percent of Missouri counties lack adequate access to health care professionals
- Missouri ranks among the top 20 states in terms of people age 65 and older who will require more medical care as they age.
- While the number of elderly is expected to double by 2030, the number of physicians who care for patients with multiple chronic diseases is expected to decline.

The Association of American Medical Colleges has called on all medical schools to increase class size by 30 percent to meet the need for more physicians in Missouri and the rest of the nation. At the same time, MU has received more than 1,500 medical school applications annually, but it only has the capacity to accept 96 new medical students each year.

To increase the medical student class size at MU, the MU School of Medicine and two health systems in Springfield, Missouri — CoxHealth and St. John's — have developed plans to create a clinical campus. This clinical campus in Springfield will produce more physicians for Southwest Missouri and the rest of the state.

The clinical campus will essentially expand the existing medical education partnership between St. John's, CoxHealth and MU. The three partners have worked together to educate physicians for the past six years. More than 75 MU medical students have already trained in Southwest Missouri through MU's rural track pipeline program, which encourages students to become physicians in rural areas of the state. MU's School of Medicine, CoxHealth and St. John's intend to expand their medical education partnership by building on their productive rural track pipeline relationship, as well as MU's successful medical education program and unique position as the No. 1 educator of physicians for Missouri.

MU has educated physicians for Missouri for more than 165 years. Nearly 45 percent of physicians who received their medical degree from MU have entered practice in Missouri, and of those, 45 percent are in primary care specialties. *U.S. News and World Report* ranks MU medical school among the top 30 medical schools in the nation in terms of primary care, and MU's family and community medicine program is ranked in the top 10.

Much of MU's success in educating medical students is attributed to its problem-based learning curriculum. The curriculum uses patient cases to teach small groups of eight medical students the basic sciences in the context of a real physician practice. Since the launch of the problem-based learning curriculum in 1993, MU medical students have scored far above their peers in medical licensing exams and residency program director reviews. To expand the current medical student class size of 96 by 30 percent and retain the curriculum's emphasis on educating students in groups of eight, the plan to

develop a clinical campus in Springfield would require an additional 32 students across all four years of the curriculum, for a total of 128 additional medical students.

At the University of Missouri School of Medicine in Columbia and most other medical schools, students complete four years of education to receive a medical degree and become a physician. Students primarily spend the first two years learning foundational aspects of medicine in educational facilities — such as classrooms, labs, libraries and auditoriums — from a variety of biomedical scientists and physician educators. Students spend much of the final two years of medical school in patient-care facilities such as hospitals and clinics. This clinical component of medical student education involves directly interacting with patients under the supervision of physicians practicing in a variety of specialties. The clinical campus partnership will allow MU medical students to complete the final two years of their education at CoxHealth and St. John’s hospitals and clinics, while the students’ first two years of medical school will be spent at MU, where many schools, colleges and other campus resources contribute to the preclinical component of medical education.

In terms of resources, the creation of an entirely new medical school requires huge costs, as well as accreditation challenges. Because of these concerns about costs, many medical schools are using regional clinical campuses to expand their services and enrollments, especially in underserved areas. However, it should be noted that this is not the only model that has been adopted by medical schools for increased enrollment and the expansion of their services. The AAMC (2008) describes three commonly used models for expanding medical school programs in the following table.

**Table 1: Models for Expanding Class Size at Existing Medical Schools**

<b>Model</b>	<b>Description</b>	<b>Example from this study</b>
In place	Expansion occurs at the existing academic medical center campus and at nearby clinical facilities.	Beginning in 2006, The Boston University School of Medicine increased class size from 160 to 175 within its current campus infrastructure.
Regional two-year campus	Branch campus at a distance from the main medical school site offers some of the medical student curriculum to a portion of the class (most commonly clinical education).	The University of Arkansas for Medical Sciences plans to establish a clinical campus in northwest Arkansas between 2009 and 2011.
Regional four-year campus	Branch campus offers all four years of medical education while operating under the accreditation umbrella of the educational program on the main medical school campus.	The Michigan State University College of Human Medicine established a new four-year medical education program in Grand Rapids. This new campus will increase overall enrollment at the school from 100 to 200 by 2010.

Source: AAMC (2008).

[Available: <https://www.aamc.org/download/82902/data/aibvol8no2.pdf> ]

MU's medical school, St. John's and CoxHealth opted to establish a clinical campus in Springfield based on its cost effectiveness. The cost effectiveness stems from two advantages: 1) there will be little construction required since the clinical campus will use CoxHealth and St. John's health systems facilities; and 2) the clinical campus will utilize volunteer clinical faculty from existing hospital systems. Additionally, the clinical campus would provide MU medical students with access to a broader patient population, thereby increasing the likelihood of their exposure to a more diverse variety of health care issues.



## 3-Previous Studies of Economic Impacts of Medical Schools

There are a number of studies measuring the economic impacts of medical schools. However, very few of these studies measure the economic impact of clinical campuses as proposed in this study. These studies can be classified into one of three categories: 1) factors affecting doctor retention, 2) economic impacts of increased health care access, and 3) community impact of medical schools. Since the MU School of Medicine's success at producing physicians who practice in Missouri is well-established in peer-reviewed literature, the following examples address the other two categories related to health care access and community impact.

### 3.1 Health Care Access

Health care access depends on two factors: 1) the availability of medical services and 2) the affordability of these services to patients. The clinical campus would help to improve the accessibility of health care services (examples are discussed in the following paragraphs). The recent introduction of the Patient Protection and Affordable Care Act (PPACA) is expected to lead to more patients being covered with various forms of insurance. This bill was signed in March 2010 and will be fully implemented in 2014. The full implementation of the PPACA is expected to increase the number of patients likely to visit hospitals, and thus increase demand for medical services.

Michigan State University (MSU) has six community campuses in six different locales. Students spend their first two years at the main campus in East Lansing and the final two years at the satellite campuses. MSU anticipates that medical school class sizes will expand by 50 students with some of the additional students spending their second and later years at the Grand Rapids campus. It is envisioned that a full four-year campus will eventually exist in Grand Rapids. Furthermore, MSU, in collaboration with Grand Valley State University, Spectrum Health and Saint Mary's Mercy Medical Center established the Grand Rapids Medical Education Partners. This new institution is a medical, educational, and research consortium with the mission to enhance the health of the Grand Rapids community.

The University of Kansas School of Medicine<sup>1</sup>- Wichita (KUMC) is one of the campuses that have successfully implemented a regional medical campus project. This campus provides hands-on learning opportunities to about 110 third- and fourth-year medical students. It provides these opportunities by utilizing more than 1,100 paid and volunteer faculty members inside three partner hospitals (Robert J. Dole Veterans Affairs Medical Center, Via Christi Health, and Wesley Medical Center) as well as doctors' offices across the state. Currently, plans are under way to expand to a full, four-year campus in Wichita, capable of educating up to 250 total students by 2015. This has increased the supply of doctors in Kansas as 54 percent of the graduates from 1997 through 2004 were still practicing in Kansas at the end of 2008. Additionally, KUMC administers the JayDoc Community Clinic, a unique clinic run by medical students with the dual

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<sup>1</sup> Information on Wichita is available on <http://www.kumc.edu/about-us.html>

objectives of providing free health care to medically underserved areas and creating opportunities for medical students to broaden and enrich their clinical skills under the supervision of volunteer physicians.

A final, but somewhat different example is the River Point Campus of the Washington State University (WSU) and the WWAMI Program (Washington, Wyoming, Alaska, Montana, and Idaho partnership with the University of Washington Medical School). Officials in Eastern Washington have identified the growing shortage of medical professionals in the region as a major problem facing the region. The River Point campus in Spokane currently has students in years one, three and four of the four-year medical program. Students begin their studies at WSU Spokane or WSU Pullman, but spend their entire second year in Seattle. Graduates then complete their program somewhere in the five-state WWAMI region. The program is being modified so that students can study in Spokane for all years of their medical school. This change is expected to allow the number of student involved in the WWAMI program to increase significantly.

### 3.2 Community Impact

Some states have mandatory reporting requirements of community benefits by all nonprofit organizations including hospitals. In the case of Missouri, there are voluntary guidelines for reporting community benefits from hospitals. In these guidelines participating hospitals are asked to disclose<sup>2</sup>: 1) the accessibility to financial assistance, 2) the community health assessment, 3) improvements in community health, 4) educational support and quality improvements, 5) state and local economic benefits including estimated tax liabilities, and 6) social accountability and uncompensated care. The Maryland Hospital Community Benefit Report (2010) defines “community benefit” as an activity that is intended to address community needs and priorities primarily through disease prevention and the improvement of health status including:

- Health services provided to vulnerable or underserved populations,
- Financial or in-kind support of public health programs,
- The donations of funds, property, or other resources that contribute to a community priority,
- Health care cost containment activities, and
- Health education screening and prevention services.

Additionally, new IRS rulings require nonprofit hospitals to provide “community benefits” to retain their federal tax-exemption, which have broadened the scope beyond charity care to include activities that benefit the community as a whole (Folkemer *et. al.* 2011).

Section 8 of this report describes community impact activities that could result from the establishment of an MU School of Medicine clinical campus in Springfield.

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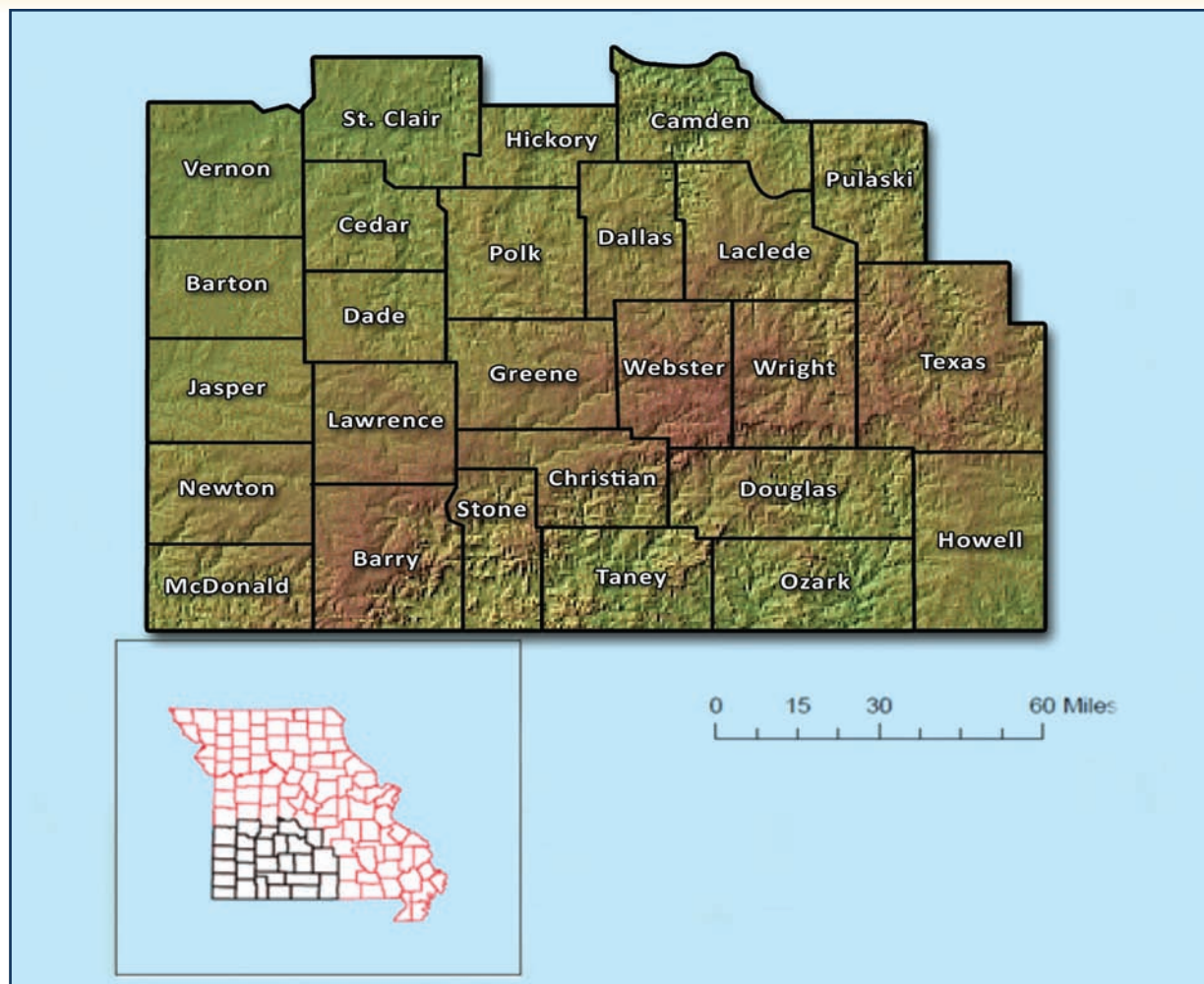
2 These points are taken from the report of <http://www.nonprofithealthcare.org/resources/CHA-VHAGuideComparedToStateLaws.pdf>

## 4-Study Area

This study examines the economic impact of the proposed clinical project in two regions: 1) Mid-Missouri and 2) Southwest Missouri, as well the entire state. The Mid-Missouri region is defined as Boone County and its contiguous counties. The Mid-Missouri region is home to the main MU campus. The Southwest Missouri region includes 26 counties in the Southwest portion of the state. The Mid-Missouri region is shown in Figure 1. Figure 2 provides a map of the Southwest Missouri region. A list of the counties in each region is provided in the Appendix.



**Figure 1: Counties in the Mid-Missouri Region**



**Figure 2: Counties in the Southwest Missouri Region**

## 5-The Demand and Supply of Doctors

The demand for medical doctors is increasing because of several factors, including the overall growth of the population, the growth of the elderly population, rising health awareness and recent legislative changes (e.g. the Patient Protection and Affordable Care Act). This trend is not unique to Missouri, in fact, the demand for physicians is expected to rise in the coming years throughout the nation (Becker and Porth, 2011). Becker and Porth estimate the physician shortage to reach 91,500 by 2020.

The Southwest Missouri region's population has grown steadily over the past 10 years, increasing from 973,000 persons in 2000 to 1.08 million persons in 2009. This growth represents an 11 percent increase in population. The Southwest Missouri region has grown faster than the rest of the state, which has seen its population increase from 5.6 million persons in 2000 to 5.99 million persons in 2009, or a 6.8 percent increase.

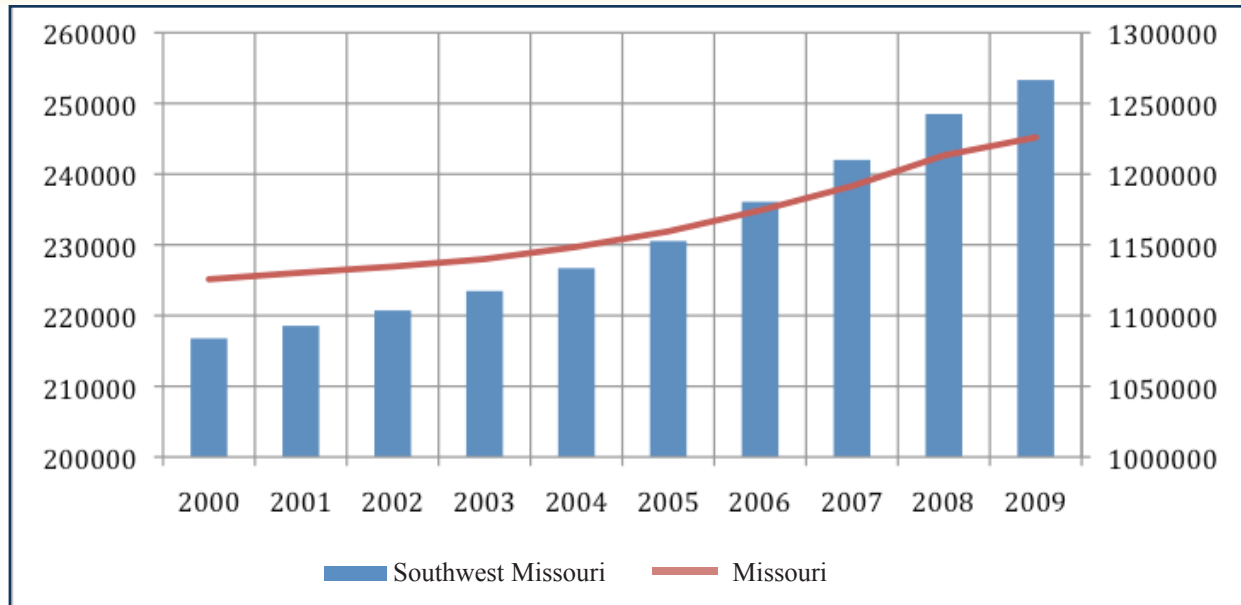
The U.S. Census Bureau estimates the population of Missouri to be 5,987,580 and the population of the Southwest Missouri region to be 1,069,017 as of July 1, 2009. The current population is expected to increase dramatically in the future. The Missouri Office of Administration (2000) estimates the population to increase to 6,746,762 and 1,343,400 by 2030 for Missouri and the Southwest region, respectively. This represents a 12.7 percent increase for Missouri and a 25.7 percent increase for the Southwest region. Population projections for the years 2015 through 2030 are provided in the table below.

**Table 2: Population in 2009 and Population Projections, 2015 - 2030**

Area	2009	2015	2020	2025	2030
<b>Southwest Region</b>	1,069,017	1,164,651	1,230,796	1,291,007	1,343,400
<b>Missouri</b>	5,987,580	6,184,390	6,389,850	6,580,868	6,746,762

Source: 2009 Population – U.S. Census Bureau; Projections – Missouri Office of Administration

The growth of overall population in the Southwest region and Missouri will increase the demand for health care services. Furthermore, the demographic groups that require the greatest level of care are persons less than 5 years of age and persons aged 65 and older. These two cohorts have grown 16.8 percent in the Southwest Missouri region over the past decade, from 216,700 persons in 2000 to 253,000 persons in 2009. Missouri has seen slower growth (8.9 percent) in these age groups from 1.1 million persons in 2000 to 1.2 million persons in 2009. The growth of these two age groups in Missouri and in the Southwest region are shown in the following figure. The Southwest region is represented on the left axis and Missouri is represented on the right axis.



**Figure 3: Population Growth Trends of Under 5 and 65 and over age groups.**  
Source: U.S. Census Bureau

Moreover, looking into the future, population projections indicate both a growth in overall population and in the groups of residents less than 5 years of age and age 65 and older. The Missouri Office of Administration (2000) projects 416,000 persons under 5 years of age in Missouri and 1.4 million persons age 65 and older by 2030. For the Southwest Missouri region, the projections are 78,000 persons under age 5 and 298,000 persons aged 65 and older by 2030. The projected populations for Missouri and the Southwest region by age groups are provided in the tables below.

**Table 3: Projected Population under Age 5, 2015 - 2030**

Area	2015	2020	2025	2030
<b>Southwest Region Population</b>	74,539	76,938	77,564	78,162
<b>Percent of Total Population</b>	6.4%	6.3%	6.0%	5.8%
<b>Missouri Population</b>	406,994	417,559	418,296	416,469
<b>Percent of Total Population</b>	6.6%	6.5%	6.4%	6.2%

Source: Missouri Office of Administration

**Table 4: Projected Population Age 65 and Older, 2015 - 2030**

Area	2015	2020	2025	2030
<b>Southwest Region Population</b>	189,834	222,216	261,250	298,198
<b>Percent of Total Population</b>	16.3%	18.1%	20.2%	22.2%
<b>Missouri Population</b>	935,979	1,079,491	1,254,934	1,414,266
<b>Percent of Total Population</b>	15.1%	16.9%	19.1%	21.0%

Source: Missouri Office of Administration



Both the increases in overall population and the increases in persons less than 5 years of age and persons aged 65 and older will necessitate additional doctors to meet their needs. As indicated in section six of this report, this program will contribute 315 doctors and 128 residents by its 27<sup>th</sup> year of operation.

Annually, the six medical schools in Missouri graduate 929 students. However, not all of these graduates are retained within Missouri (as previously indicated, approximately 45 percent of MU medical school graduates practice in Missouri). The number of physicians in Missouri has increased from 14,779 in 2003 to 16,100 in 2008, a 9 percent increase. The number of physicians in Southwest Missouri has also increased, although at a slower rate (7.5 percent) over the same period, from 1,674 in 2003 to 1,800 in 2008.

The total number of physicians in the Southwest region and in Missouri only tells part of the story. A deeper understanding of the situation can be gained by examining the ratio of the physicians per 100,000 persons (P100K). The number of doctors for every 100,000 persons has remained relatively steady over the period 2003 – 2008 in the Southwest region, increasing from 167 to 167.9, a 0.54 percent change.<sup>3</sup> Missouri, on the other hand, has seen a 4.6 percent increase in its physicians per 100,000 population ratio, increasing from 258.6 in 2003 to 270 in 2008.<sup>4</sup>

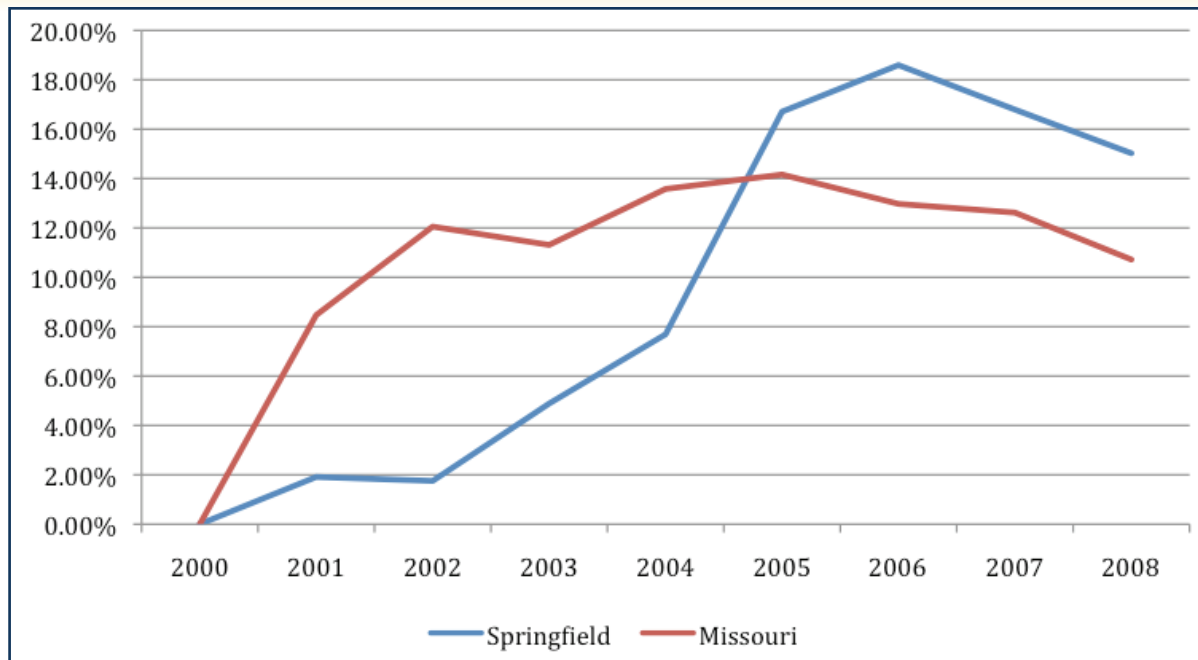
If we consider the number of doctors relative to the two age groups with the greatest demand for medical services, persons less than 5 years of age and persons aged 65 and older, we find a similar situation. The Southwest region has fewer doctors per 100,000 persons in these cohorts (724) than Missouri (1,328) in 2008. Furthermore, the Southwest region has seen this ratio decrease since 2003, when it was 749, whereas Missouri has seen this ratio increase since 2003, when it was 1,296.

Moreover, the demand for hospital services (measured by patients discharged from hospitals) is increasing in Missouri and in the Southwest region. The number of patients discharged from Southwest region hospitals has increased from 112,000 in 2000 to 124,000 in 2008, a 15 percent increase. Missouri has seen a somewhat slower growth from 680,000 in 2000 to 760,000 in 2008, a 10.7 percent increase. The annual growth rate in patient discharges is presented in the following figure.

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3 Expressed in another way, this is 599 persons and 596 persons per physician for 2003 and 2008, respectively.

4 This equates to 387 and 370 persons per physician for 2003 and 2008, respectively.



**Figure 4: Annual Growth Rate in Patient Discharges, Southwest Region and Missouri, 2000-2008**

Source: Department of Health and Senior Services

Concern has also been raised that in addition to population pressure, the recently enacted Patient Protection and Affordable Care Act (PPACA) will increase the demand for already limited health care services. Unequivocally, increased access to health care for Americans and Missourians is a desirable goal; however, it carries with it the potential that health workforce shortages will be further exacerbated (Williams and Redhead, 2010).

Finally, a recent report from the Missouri Hospital Association (Becker and Porth, 2011) highlights the rising demand for physician services in rural areas owing to aging and poorer rural residents coupled with a decreased supply of doctors relative to their urban counterparts. Becker and Porth find that in rural Missouri, there is one primary care physician for every 1,776 residents whereas in metropolitan Missouri, there is one primary care physician for every 962 residents. Further strain is added to Missouri's rural health care delivery system because a greater proportion of rural doctors are approaching retirement age than in metropolitan areas. Becker and Porth provide the alarming statistic that 55 percent of all physicians are age 50 and older, while 62 percent of rural physicians fall within this demographic.

A preponderance of the evidence presented in this report makes one thing clear; more physicians are needed in the coming years, especially in rural areas. Programs, such as the proposed clinical campus, which can potentially increase the supply of doctors, have the potential to meet the expected increases in demand. Meeting anticipated increases in demand is paramount to ensure that rural residents of Missouri are not left with physician shortages.



## 6-Retention of Doctors

The retention of medical doctors in rural areas is influenced by numerous factors, including some that can be controlled by medical schools. Curran and Rourke (2004) list the factors under the control of medical schools that influence the likelihood of medical students entering rural primary care practice as: 1) rural student recruitment, 2) admissions policies, 3) rural-oriented medical curriculum, 4) rural practice learning experiences, 5) faculty values and attitudes, and 6) advanced procedural skills training.

Missouri had 2,073 medical students enrolled in Missouri medical and osteopathic schools in 2008, which translates into 62.9 medical students per 100,000 Missouri residents, the second highest ratio in the nation. Given this, it is plain to see the problem is not that too few doctors are trained in Missouri, but rather, that there is a problem with students staying in-state, particularly in areas of need.

In the years 1994 through 1997, 44 percent of MU medical school graduates practiced in Missouri. The school expects this retention rate can be increased to 55 percent in the next 10 years given the proposed clinical campus in Springfield.

MU's medical school is doing better than the national average in terms of retaining medical graduates in the state. The AAMC<sup>5</sup> estimates that approximately 45 percent of MU medical school graduates practiced in Missouri, whereas only 37 percent of graduates in the nation practiced in the state of their medical school for the years 1994 through 1998. Moreover, 45 percent of those MU medical school graduates practiced in a primary care specialty, while the national average was only 36.1 percent (the highest in the nation was 45.5 percent). Finally, 15.5 percent of MU medical school graduates practiced in a rural area, while only 10 percent nationally did so.

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5      These data taken from the MU SOM report.

## 7-Measuring the Economic Contribution of the Proposed Clinical Campus

This study utilizes the Impact Modeling for PLANing (IMPLAN) system to estimate the economic impacts of the proposed clinical campus in Springfield and the increased class size at MU's main campus. IMPLAN is an input-output model used to measure the economic impact of economic activities. The IMPLAN input-output model measures and estimates the effects of the purchase of goods and services within a regional economy at a given point of time. A change or shock in one (or more) sector(s) of a regional economy ripples through the economy due to the linkages between the various sectors of the regional economy.

Input-output models report the effects of these shocks in two ways: 1) easily understandable impacts such as jobs created or the increases in regional labor income and 2) multipliers which measure the total effect of a unit increase in a given output (e.g. number of jobs created in addition to the jobs directly created by a given shock). This report provides both the effects and the multipliers associated with the proposed clinical campus plan.

### **This report measures four types of impacts:**

- 1) Output: the output impact measures the total additional value of all industries' sales.
- 2) Value-Added: the value-added impact measures the difference between total output and the costs of producing that output. Value added is the contribution of the sector to gross domestic product (GDP) and is the output less the costs of inputs other than labor. Value added is thus comprised of employee salaries, proprietors' income, taxes, and other property income.
- 3) Labor income: labor income is simply the moneys paid by firms to their workers.
- 4) Employment: employment is the number of jobs created by a given shock.

### **The impacts are broken down into three types of effects:**

- 1) Direct effects: the direct effects measure the increases in regional output, value-added, labor income, and employment from a given shock. An example of this effect would be the hiring of new faculty and staff to educate the students.
- 2) Indirect effects: the indirect effects measure the additional output, value-added, labor income, and employment from the purchase of goods and services needed to produce a given industry's output. An example of this effect is the purchase of materials and services used by faculty, students and administration to operate the program, and all the purchases the suppliers make, etc.
- 3) Induced effects: the induced effects measure the change in regional output, value-added, labor income, and employment from the direct and indirect employees' purchases. An example of this is groceries and other goods and services that new faculty member buys with their salary.

Together, these three effects are summed to get the total effect.

The total effects indicate an activity's multiplier effects. A multiplier is the ratio of total effect of a given shock to its direct effect. Thus, an employment multiplier of 2.5 indicates that for each direct job created, 1.5 additional jobs are created due to the indirect and induced effects.

One can examine the effects of a change in one or several economic activities to predict its effect on a specific state, regional, or local economy (impact analysis). The IMPLAN input-output accounts capture all monetary market transactions for consumption in a given time period.

Each industry that produces goods or services generates demand for other goods and services and this demand is multiplied through a particular economy until it dissipates through "leakages" to economies outside the specified area. IMPLAN models discern and calculate leakage from local, regional, and state economic areas based on workforce characteristics, the inputs required by specific types of businesses, and the availability of both in the economic area. Consequently, economic impacts that accrue to other regions or states as a consequence of a change in demand are not counted as impacts within the economic area.

## 7.1 Construction Phase Economic Impacts

Prior to educating any students, the construction of suitable facilities must be undertaken. Construction efforts create jobs and other economic benefits for a community, but these benefits only persist for the duration of the construction period. The economic impacts are defined as the net change in regional output, value-added, labor income and employment owing from the construction. Additionally, each of these impacts is broken into the direct (or initial) expenditure, the indirect and induced expenditure. The sum of these rounds is given in the total figures.

Construction expenditures in Columbia are expected to be approximately \$30 million. This expenditure will generate \$38.7 million in total economic output in the Mid-Missouri region. Moreover, regional value-added and labor income will increase by \$17.4 million and approximately \$13.6 million, respectively. Finally, the construction in Columbia will create 357.6 jobs-years<sup>6</sup> over the duration of the project. The economic impacts from the construction phase in the Mid-Missouri region are summarized in the table below.

**Table 5: Effects and Multipliers for Construction Phase in Mid-Missouri Region**

<b>Impact</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>	<b>Multiplier</b>
<b>Output</b>	\$24,361,258	\$7,273,493	\$7,045,934	\$38,680,685	1.59
<b>Value-Added</b>	\$9,503,202	\$3,852,244	\$4,015,027	\$17,370,473	1.83
<b>Labor Income</b>	\$8,638,891	\$2,693,018	\$2,231,234	\$13,563,143	1.57
<b>Employment</b>	220.5	63.0	74.1	357.6	1.62

Source: IMPLAN

<sup>6</sup> A job-year is one job that lasts for a full year. Thus a project that creates 100 job-years over a two year period, creates an average of 50 jobs each year for 2 years.

Construction expenses in the Southwest region are anticipated to be much less than those in Mid-Missouri. The estimated \$3 million in construction expenditures in Springfield are expected to generate \$4.4 million in increased output, \$1.9 million in increased value-added, \$1.5 million in increased labor income, and 42.2 job-years. The projected economic impacts from the construction phase in the Southwest region are detailed in the table below.

**Table 6: Effects and Multipliers for Construction Phase in the Southwest Region**

<b>Impact</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>	<b>Multiplier</b>
<b>Output</b>	\$2,840,351	\$747,134	\$814,257	\$4,401,742	1.55
<b>Value-Added</b>	\$1,034,803	\$388,602	\$460,690	\$1,884,096	1.82
<b>Labor Income</b>	\$941,086	\$256,337	\$258,633	\$1,456,056	1.55
<b>Employment</b>	27.1	6.6	8.7	42.4	1.57

Source: IMPLAN

The total construction expenditures of \$33 million dollars will increase statewide output by \$56.5 million. Missouri value-added and labor incomes will increase by \$27 million and \$20.6 million, respectively. Finally, the construction phase will create 475.9 job-years for the Missouri economy. Note that the total impact of the construction expenditures on the state economy is larger than the sum of the impacts of the two individual regions because significant amounts of the impacts occur outside the regions but within the state. These results are summarized in the table below.

**Table 7: Effects and Multipliers for Construction Phase in Missouri**

<b>Impact</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>	<b>Multiplier</b>
<b>Output</b>	\$31,299,714	\$11,402,042	\$13,757,800	\$56,459,556	1.80
<b>Value-Added</b>	\$13,122,888	\$6,053,017	\$7,794,427	\$26,970,332	2.06
<b>Labor Income</b>	\$11,928,564	\$4,165,480	\$4,465,341	\$20,559,385	1.72
<b>Employment</b>	266.3	82.6	127.0	475.9	1.79

Source: IMPLAN

## 7.2 Operating Phase Economic Impacts

The construction phase provides regional economic benefits for the construction phase of the project whereas the operating phase provides ongoing benefits for as long as the program graduates students. Because the program potentially lasts in perpetuity, the impacts estimated in this section are annual estimates and not cumulative as in the case of construction.

The regional economic impacts predicted in this section are due to three types of spending: 1) expenditures by the medical school to provide the education program; 2) expenditures by the students aside from tuition expenditures (e.g. room and board, books, etc.); and 3) spending from the increased number of doctors in the Southwest region following their graduation.

The direct output increase in Mid-Missouri from the medical school's increased enrollment is estimated to be \$7 million. Of this \$7 million, approximately \$5 million will be direct value-added (in this case \$5 million in increased labor income). The labor income will compensate 50 new employees including new faculty members and administrative and support staff. This is expected to increase total output in the Mid-Missouri region by \$11.6 million, value-added by \$7.6 million, labor income by \$6.4 million and employment by 92.8 jobs per year. These impacts are presented in the table below.

**Table 8: Economic Impacts of Annual Operating Expenditures in Columbia**

<b>Impact</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>	<b>Multiplier</b>
<b>Output</b>	\$7,000,000	\$1,348,248	\$3,206,832	\$11,555,080	1.65
<b>Value-Added</b>	\$5,030,898	\$728,881	\$1,827,904	\$7,587,683	1.51
<b>Labor Income</b>	\$5,000,000	\$366,115	\$1,019,064	\$6,385,179	1.28
<b>Employment</b>	50.0	9.1	33.7	92.8	1.86

Source: IMPLAN

The creation and ongoing operation of the clinical campus in the Southwest region is anticipated to generate \$3 million in increased output, \$2.9 million in increased value-added (all increased labor income), and have a direct employment impact of 85 jobs per year. The operations are expected to lead to a total increase in regional output of \$4.9 million. Regional value-added is expected to increase by nearly \$4 million and area labor income is expected to increase by \$3.5 million. This activity will generate approximately 105 total new jobs in the Southwest region. The details of the increased economic activity in the Southwest region from the clinical campus are presented in the table below.

**Table 9: Impact of Annual Operating Expenditures in the Southwest Region**

<b>Impact</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>	<b>Multiplier</b>
<b>Output</b>	\$3,000,000	\$35,715	\$1,866,404	\$4,902,120	1.63
<b>Value-Added</b>	\$2,901,153	\$20,274	\$1,056,031	\$3,977,457	1.37
<b>Labor Income</b>	\$2,900,000	\$9,592	\$595,161	\$3,504,753	1.21
<b>Employment</b>	85.0	0.3	19.9	105.2	1.24

Source: IMPLAN

The total annual impact on Missouri's economy from the operating phase is an increased state output of \$17.6 million. State value-added will increase by \$12.2 million and state labor income will increase by \$10.3 million. Additionally, 203 jobs will be created from the operating phase. Again the statewide impacts are larger than the sum of the two regional impacts because of impacts outside the regions but inside the state. The statewide economic impacts from the operational phase are provided in the following table.

**Table 10: Impact of Annual Operating Expenditures in Missouri**

<b>Impact</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>	<b>Multiplier</b>
<b>Output</b>	\$10,000,000	\$840,843	\$6,769,508	\$17,610,351	1.76
<b>Value-Added</b>	\$7,932,894	\$474,376	\$3,835,588	\$12,242,857	1.54
<b>Labor Income</b>	\$7,900,000	\$243,366	\$2,200,227	\$10,343,594	1.31
<b>Employment</b>	135.0	6.0	62.4	203.4	1.51

Source: IMPLAN

The second type of economic impact from the operational phase is the non-tuition spending from the new students<sup>7</sup>. Expenditures of this type are expenditures on room and board, personal expenses and transportation, books and supplies, and health insurance. Moreover, because the students have different expenses depending on what year of the program they are in and since the students will be relocating to Springfield after the second year, the expenses will be broken down for each of the first four years. The economic impacts for year four can be viewed as the recurring impacts for each subsequent year.

In the first year of the program, 32 new medical school students will enroll in MU's medical school in Columbia. Each of the students will spend approximately \$9,954 on room and board, \$6,670 on personal expenses and transportation, \$2,400 on books and supplies, and \$2,400 on health insurance<sup>8</sup>. However, it should be noted that some purchases, such as purchases of books and supplies, will be partially sourced from outside the region (e.g. students purchasing text books from online retailers) and therefore, some of these purchases will leave the regional economy in the form of leakages. These expenditures create total economic impacts in the Mid-Missouri region of \$615,000 in total output, value-added impacts of \$334,000, labor income of \$195,000 and employment of 6 jobs. The economic impacts from the first year of operation are provided in the table below.

**Table 11: Impact of Student Spending in Year 1**

<b>First Year Students</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>	<b>Multiplier</b>
<b>Output</b>	\$384,574	\$132,295	\$98,396	\$615,264	1.6
<b>Value-Added</b>	\$210,631	\$67,508	\$56,084	\$334,223	1.6
<b>Labor Income</b>	\$121,306	\$42,570	\$31,205	\$195,081	1.6
<b>Employment</b>	3.9	1.1	1.0	6.1	1.5

Source: University of Missouri School of Medicine 2011 – 2012 Cost of Attendance and IMPLAN

The second year of the program enrolls another 32 students in the program. The first year students have impacts similar to the previous year's cohort. The second year students maintain similar room and board, personal expenses, and transportation, and health insurance expenditures, but spend less on

<sup>7</sup> Tuition expenditures are not included in this category because tuition is collected by the University of Missouri and used to cover part of operating expenditures. The operating expenditures and their impact is included in the section above.

<sup>8</sup> There may be additional expenditures of the medical school students (e.g. daycare if they have children, computers, etc.) that are not included in these estimates.

books and supplies (\$1,020). The second year students' expenditures generate an additional \$588,000 in output, \$317,000 in value-added, \$185,000 in labor income, and over 5 jobs in the Mid-Missouri region. The combined effects of both classes of students' expenditures are \$1.2 million in output, \$651,000 in value-added, \$380,000 in labor income and 12 jobs. The economic impacts from the first two years of operation are provided in the table below.

**Table 12: Impact of Student Spending in Year 2**

<b>First Year Students</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>	<b>Multiplier</b>
<b>Output</b>	\$384,574	\$132,295	\$98,396	\$615,264	1.6
<b>Value-Added</b>	\$210,631	\$67,508	\$56,084	\$334,223	1.6
<b>Labor Income</b>	\$121,306	\$42,570	\$31,205	\$195,081	1.6
<b>Employment</b>	3.9	1.1	1.0	6.1	1.5
<b>Second Year Students</b>					
<b>Output</b>	\$367,431	\$127,947	\$93,107	\$588,484	1.6
<b>Value-Added</b>	\$198,964	\$65,084	\$53,069	\$317,118	1.6
<b>Labor Income</b>	\$113,907	\$41,110	\$29,525	\$184,542	1.6
<b>Employment</b>	3.6	1.1	1.0	5.6	1.6
<b>Totals</b>					
<b>Output</b>	\$752,005	\$260,241	\$191,502	\$1,203,749	1.6
<b>Value-Added</b>	\$409,596	\$132,592	\$109,154	\$651,341	1.6
<b>Labor Income</b>	\$235,214	\$83,680	\$60,730	\$379,624	1.6
<b>Employment</b>	7.5	2.1	2.0	11.7	1.6

Source: University of Missouri School of Medicine 2011 – 2012 Cost of Attendance and IMPLAN

In the third year of the program another 32 students enter. The 32 third-year students from the first expanded class relocate to Springfield<sup>9</sup> for the clinical portion of their education. The students in their first two years of the program have similar expenditures to what was previously estimated. The only significant change in expenditure for this third year students is the reduced spending on books and supplies, now only \$930. The other difference is that the third year students' impact is in the Southwest region. The total economic impacts from the third year students are \$612,000 of increased output, \$331,000 of increased value-added, \$194,000 of increased labor income, and 6 jobs. Additionally, the Mid-Missouri region continues to maintain the economic impacts discussed previously. The economic impacts from the first three years of operation are given in the following table.

<sup>9</sup> While it is likely that the relocated students will incur extra expenses from moving, there is no established method of estimating these costs or where they will accrue. As such, they are omitted from the impact estimates.



**Table 13: Impact of Student Spending in Year 3**

<b>First Year Students</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>	<b>Multiplier</b>
<b>Output</b>	\$384,574	\$132,295	\$98,396	\$615,264	1.6
<b>Value-Added</b>	\$210,631	\$67,508	\$56,084	\$334,223	1.6
<b>Labor Income</b>	\$121,306	\$42,570	\$31,205	\$195,081	1.6
<b>Employment</b>	3.9	1.1	1.0	6.1	1.5
<b>Second Year Students</b>					
<b>Output</b>	\$367,431	\$127,947	\$93,107	\$588,484	1.6
<b>Value-Added</b>	\$198,964	\$65,084	\$53,069	\$317,118	1.6
<b>Labor Income</b>	\$113,907	\$41,110	\$29,525	\$184,542	1.6
<b>Employment</b>	3.6	1.1	1.0	5.6	1.6
<b>Total Mid-Missouri Region</b>					
<b>Output</b>	\$752,005	\$260,241	\$191,502	\$1,203,749	1.6
<b>Value-Added</b>	\$409,596	\$132,592	\$109,154	\$651,341	1.6
<b>Labor Income</b>	\$235,214	\$83,680	\$60,730	\$379,624	1.6
<b>Employment</b>	7.5	2.1	2.0	11.7	1.6
<b>Third Year Students</b>					
<b>Output</b>	\$376,092	\$130,240	\$105,508	\$611,839	1.6
<b>Value-Added</b>	\$205,733	\$65,803	\$59,696	\$331,232	1.6
<b>Labor Income</b>	\$118,984	\$41,120	\$33,583	\$193,687	1.6
<b>Employment</b>	4.0	1.2	1.1	6.3	1.6

Source: University of Missouri School of Medicine 2011 – 2012 Cost of Attendance and IMPLAN

The fourth year marks the first year in which the program is fully operational. Another 32 students enroll and another 32 students relocate to Springfield. Fourth year students again purchase fewer books and supplies (\$560), but maintain other expenditures. The economic impacts in this fourth year of operation are the economic impacts that can be expected to occur in each subsequent year of the program. The expenditures of the fourth year students generates an additional \$594,000 in output, \$320,000 in value-added, \$186,500 in labor income, and 6 jobs. Coupled with the third year students' spending this has a total annual effect on the Southwest Missouri economy of \$1.2 million in output, \$651,000 of value-added, \$380,000 of labor income, and 12 jobs. The total annual economic impacts for both the Mid-Missouri and Southwest regions are \$2.4 million in output, \$1.3 million in value-added, \$760,000 in labor income, and 24 jobs. These economic impacts are detailed in the following table.



**Table 14: Impact of Student Spending in Year 4**

<b>First Year Students</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>	<b>Multiplier</b>
<b>Output</b>	\$384,574	\$132,295	\$98,396	\$615,264	1.6
<b>Value-Added</b>	\$210,631	\$67,508	\$56,084	\$334,223	1.6
<b>Labor Income</b>	\$121,306	\$42,570	\$31,205	\$195,081	1.6
<b>Employment</b>	3.9	1.1	1.0	6.1	1.5
<b>Second Year Students</b>					
<b>Output</b>	\$367,431	\$127,947	\$93,107	\$588,484	1.6
<b>Value-Added</b>	\$198,964	\$65,084	\$53,069	\$317,118	1.6
<b>Labor Income</b>	\$113,907	\$41,110	\$29,525	\$184,542	1.6
<b>Employment</b>	3.6	1.1	1.0	5.6	1.6
<b>Total Mid-Missouri Region</b>					
<b>Output</b>	\$752,005	\$260,241	\$191,502	\$1,203,749	1.6
<b>Value-Added</b>	\$409,596	\$132,592	\$109,154	\$651,341	1.6
<b>Labor Income</b>	\$235,214	\$83,680	\$60,730	\$379,624	1.6
<b>Employment</b>	7.5	2.1	2.0	11.7	1.6
<b>Third Year Students</b>					
<b>Output</b>	\$376,092	\$130,240	\$105,508	\$611,839	1.6
<b>Value-Added</b>	\$205,733	\$65,803	\$59,696	\$331,232	1.6
<b>Labor Income</b>	\$118,984	\$41,120	\$33,583	\$193,687	1.6
<b>Employment</b>	4.0	1.2	1.1	6.3	1.6
<b>Fourth Year Students</b>					
<b>Output</b>	\$364,640	\$127,499	\$101,597	\$593,736	1.6
<b>Value-Added</b>	\$197,857	\$64,280	\$57,483	\$319,621	1.6
<b>Labor Income</b>	\$113,961	\$40,217	\$32,338	\$186,516	1.6
<b>Employment</b>	3.7	1.2	1.1	5.9	1.6
<b>Total Southwest Region</b>					
<b>Output</b>	\$740,732	\$257,738	\$207,105	\$1,205,575	1.6
<b>Value-Added</b>	\$403,590	\$130,084	\$117,179	\$650,853	1.6
<b>Labor Income</b>	\$232,945	\$81,338	\$65,920	\$380,203	1.6
<b>Employment</b>	7.6	2.4	2.2	12.2	1.6

Source: University of Missouri School of Medicine 2011 – 2012 Cost of Attendance and IMPLAN

The total statewide economic impacts of the medical students' spending will increase Missouri annual total output by \$2.8 million. Additionally, Missouri's yearly value-added will increase by \$1.6 million and yearly labor income will increase by \$942,000. Finally, Missouri's annual employment will increase by about 26 jobs. The statewide impacts of the students' spending are summarized in the following table.

**Table 15: Impacts of Student Spending in Missouri**

<b>First Year Students</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>	<b>Multiplier</b>
<b>Output</b>	\$404,351	\$173,688	\$164,126	\$742,166	1.8
<b>Value-Added</b>	\$227,192	\$93,800	\$92,989	\$413,981	1.8
<b>Labor Income</b>	\$134,312	\$60,269	\$53,305	\$247,886	1.8
<b>Employment</b>	4.0	1.4	1.5	6.9	1.7
<b>Second Year Students</b>					
<b>Output</b>	\$383,811	\$167,555	\$155,112	\$706,477	1.8
<b>Value-Added</b>	\$213,560	\$90,206	\$87,882	\$391,647	1.8
<b>Labor Income</b>	\$125,850	\$58,063	\$50,378	\$234,290	1.9
<b>Employment</b>	3.7	1.3	1.4	6.4	1.7
<b>Third Year Students</b>					
<b>Output</b>	\$382,471	\$167,155	\$154,524	\$704,150	1.8
<b>Value-Added</b>	\$212,670	\$89,972	\$87,549	\$390,191	1.8
<b>Labor Income</b>	\$125,298	\$57,919	\$50,187	\$233,404	1.9
<b>Employment</b>	3.6	1.3	1.4	6.4	1.8
<b>Fourth Year Students</b>					
<b>Output</b>	\$371,736	\$163,951	\$149,685	\$685,373	1.8
<b>Value-Added</b>	\$205,465	\$88,098	\$84,807	\$378,370	1.8
<b>Labor Income</b>	\$120,706	\$56,781	\$48,616	\$226,102	1.9
<b>Employment</b>	3.4	1.3	1.4	6.1	1.8
<b>Total All Students</b>					
<b>Output</b>	\$1,542,369	\$672,349	\$623,448	\$2,838,165	1.8
<b>Value-Added</b>	\$858,887	\$362,075	\$353,227	\$1,574,189	1.8
<b>Labor Income</b>	\$506,165	\$233,031	\$202,486	\$941,682	1.9
<b>Employment</b>	14.8	5.3	5.8	25.8	1.7

Source: University of Missouri School of Medicine 2011 – 2012 Cost of Attendance and IMPLAN

The final type of economic impact is the changes in regional output, value-added, labor-income and employment resulting from the doctors trained by this program. After graduating from the program, the graduates enter the residency phase of their studies. Medical residency lasts between three and five years. Upon completing the residency phase of their education, residents training for a sub-specialty would enlist in a fellowship. To model the economic impacts of the residency phase we assume that 16 medical school graduates will complete the first three years of their residency in the Southwest region. After the completion of the third year, we assume one-third of the residents enter practice and the remaining two thirds enter the fourth year of residency. Of the one-third that enter practice, a percentage is assumed to stay in region (ranging from 40 percent in the first year to 55 percent in the 10th year) and begin earning a physician's

salary. Another one-third of the residents are assumed to complete their residency after their fourth year, of which one-half are retained in the Southwest region and others seek employment outside of the region. After completing their fifth year of residency, it is assumed that all remaining residents in that cohort enter practice. This process is assumed to apply to each graduating class.

Each new physician will establish an office and hire a staff. The impact of each new physician will depend on his or her total practice revenues. We estimated these based on national, state and regional estimates of physician income and employment.<sup>10</sup> The number of graduates practicing in the region as physicians and as residents and their total salaries are provided in the table below. It should be noted that the estimates in the table contain projections of doctors through the 27<sup>th</sup> year of the program, at which time it is assumed that the first graduating class has been employed as physicians for 18 – 20 years (depending on length of residency). As can be seen in the table, the first graduates will not enter their residency until the fifth year of the operational phase of the program. Moreover, by the 27<sup>th</sup> year of the program, the expansion of the MU School of Medicine and Springfield clinical campus is expected to have contributed to the Southwest Missouri region an additional 315 physicians and 51.2 residents earning total annual salaries of nearly \$60 million.

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<sup>10</sup> We also compared our estimates with those of the American Academy of Family Physicians (2007) and found our estimates of total impacts to be marginally higher, possibly because of increases in costs since the AAFP study.

**Table 16: Contributions to the Number of Residents and Physicians in the Southwest Missouri Region**

<b>Program Year</b>	<b>Number of Residents</b>	<b>Resident Income</b>	<b>Number of Physicians</b>	<b>Physician Revenues</b>
5	13	\$608,013	0	\$0
6	26	\$1,238,323	0	\$0
7	38	\$1,890,406	0	\$0
8	47	\$2,345,000	4	\$2,703,997
9	51	\$2,560,000	13	\$8,300,642
10	51	\$2,560,000	27	\$16,978,586
11	51	\$2,560,000	41	\$26,033,832
12	51	\$2,560,000	56	\$35,466,380
13	51	\$2,560,000	72	\$45,150,463
14	51	\$2,560,000	88	\$55,211,847
15	51	\$2,560,000	104	\$65,650,533
16	51	\$2,560,000	121	\$76,340,754
17	51	\$2,560,000	139	\$87,408,277
18	51	\$2,560,000	157	\$98,475,800
19	51	\$2,560,000	174	\$109,543,323
20	51	\$2,560,000	192	\$120,610,846
21	51	\$2,560,000	209	\$131,678,368
22	51	\$2,560,000	227	\$142,745,891
23	51	\$2,560,000	245	\$153,813,414
24	51	\$2,560,000	262	\$164,880,937
25	51	\$2,560,000	280	\$175,948,460
26	51	\$2,560,000	297	\$187,015,983
27	51	\$2,560,000	315	\$198,083,505

Source: Residents' Salaries – University of Missouri School of Medicine; Physicians' Salaries – Medical Group Management Association

The salaries of the residents and the physicians' business revenues generate regional economic impacts as they pay their employees and medical supplies, and spend their incomes on goods and services in the regional economy. The table above reports the gross salaries paid to the residents and revenues earned by the practicing physicians. Once the appropriate deductions have been made, the residents' income is assumed to be spent as indicated by IMPLAN's Personal Consumption Expenditure patterns for the relevant household income level and the physicians' revenues are treated as new final demand for IMPLAN sector 395, offices of physicians, dentists, and other health practitioners. By the 27<sup>th</sup> year of program operation, the residents and physicians' salaries will generate \$48.3 million in gross sales, \$27.25 million in GDP, \$15 million in labor income, and 521.9 jobs (in addition to the jobs of the doctors and physicians) in the Southwest Missouri economy. These estimates are provided in the following table.

**Table 17: Regional Economic Impacts of Residents and Physicians**

<b>Program Year</b>	<b>Gross sales</b>	<b>GDP</b>	<b>Labor Income</b>	<b>Employment</b>
5	\$1,140,024	\$909,587	\$781,297	19
6	\$2,321,856	\$1,852,531	\$1,591,245	38
7	\$3,544,511	\$2,828,047	\$2,429,172	58
8	\$8,799,223	\$6,322,159	\$5,219,543	112
9	\$18,314,184	\$12,468,205	\$10,062,177	201
10	\$32,442,649	\$21,499,307	\$17,142,598	329
11	\$47,185,396	\$30,923,065	\$24,530,864	463
12	\$62,542,423	\$40,739,480	\$32,226,974	602
13	\$78,308,971	\$50,817,666	\$40,128,314	745
14	\$94,689,801	\$61,288,508	\$48,337,498	894
15	\$111,684,911	\$72,152,007	\$56,854,527	1,048
16	\$129,089,542	\$83,277,277	\$65,576,785	1,206
17	\$147,108,454	\$94,795,204	\$74,606,887	1,369
18	\$165,127,366	\$106,313,131	\$83,636,990	1,533
19	\$183,146,279	\$117,831,058	\$92,667,092	1,696
20	\$201,165,191	\$129,348,985	\$101,697,195	1,860
21	\$219,184,103	\$140,866,911	\$110,727,298	2,023
22	\$237,203,015	\$152,384,838	\$119,757,400	2,186
23	\$255,221,927	\$163,902,765	\$128,787,503	2,350
24	\$273,240,840	\$175,420,692	\$137,817,605	2,513
25	\$291,259,752	\$186,938,618	\$146,847,708	2,677
26	\$309,278,664	\$198,456,545	\$155,877,810	2,840
27	\$327,297,576	\$209,974,472	\$164,907,913	3,004

Source: IMPLAN

Additionally, it should be noted that the impacts in the table above only encompass the impacts from the residents' salaries and physicians' gross revenues. A number of other benefits of increased numbers of physicians, such as reduce travel costs of patients and improved health of the population, have been ignored.

The economic impacts of residents' salaries and physicians' revenues extend beyond just those benefits reported for the Southwest Missouri region. These salaries and revenues increase statewide total gross sales by \$56.6 million. Further, they increase Missouri GDP and labor incomes by \$32 million and \$18.1 million, respectively. Finally, they increase statewide employment by 530.9 jobs. These economic impacts are reported in the following table.

**Table 18: Statewide Economic Impacts of Residents and Physicians**

<b>Program Year</b>	<b>Gross sales</b>	<b>GDP</b>	<b>Labor Income</b>	<b>Employment</b>
5	\$1,276,827	\$986,805	\$829,330	19
6	\$2,600,478	\$2,009,798	\$1,689,073	39
7	\$3,969,853	\$3,068,129	\$2,578,514	59
8	\$9,900,344	\$6,936,182	\$5,596,696	117
9	\$20,650,684	\$13,764,010	\$10,853,497	214
10	\$36,619,672	\$23,809,920	\$18,549,775	354
11	\$53,282,963	\$34,292,607	\$26,580,673	500
12	\$70,640,559	\$45,212,074	\$34,946,192	651
13	\$88,461,023	\$56,422,726	\$43,534,792	807
14	\$106,975,792	\$68,070,157	\$52,458,012	969
15	\$126,184,864	\$80,154,366	\$61,715,854	1,137
16	\$145,856,805	\$92,529,762	\$71,196,775	1,310
17	\$166,223,051	\$105,341,936	\$81,012,318	1,488
18	\$186,589,296	\$118,154,110	\$90,827,860	1,666
19	\$206,955,541	\$130,966,283	\$100,643,403	1,844
20	\$227,321,786	\$143,778,457	\$110,458,945	2,022
21	\$247,688,032	\$156,590,631	\$120,274,488	2,200
22	\$268,054,277	\$169,402,805	\$130,090,031	2,379
23	\$288,420,522	\$182,214,979	\$139,905,573	2,557
24	\$308,786,767	\$195,027,153	\$149,721,116	2,735
25	\$329,153,013	\$207,839,327	\$159,536,658	2,913
26	\$349,519,258	\$220,651,501	\$169,352,201	3,091
27	\$369,885,503	\$233,463,675	\$179,167,743	3,270

Source: IMPLAN

The estimates above involve very strong assumptions about the way in which this program will affect the local and state economy. As with all analyses using multipliers, it is assumed that the marginal effect of changes equals the average effect of the sectors being studied. That is to say, we have assumed that because each physician in the economy has an average number of patients, and generates an average level of annual revenues, employs an average number of office and support staff, and purchases an average amount of supplies and services, that additional physicians in the region will have this same impact. There are a number of reasons to believe that the physicians' actual impact will be less than this. First, the demand for their services is not unlimited. Some of the new physicians' patients and revenues will come at the expense of existing physicians in the region or state. Second, over time the increased number of physicians may discourage the location or relocation of other physicians to the region. Furthermore, the jobs created by the physicians might partially be offset by displaced jobs in other sectors of the regional economy, especially during periods of near full employment. Together these

displacement effects mean that the marginal impacts of the new physicians will be less than the average impacts of physicians, especially at the state level because many of the displacement effects will occur outside the region under study.

On the other hand, it is likely that we have overlooked certain positive affects that the additional physicians will have on the regional economy. First, the additional health care professionals will improve labor productivity of the regional labor force and increase the quality of life of residents, making the region more attractive to new employers, especially those types of employers that make significant investments in their workforce. Improved health, quality of life and employment opportunities will also increase the attractiveness of the region to individuals and families. Together these quality of life enhancements mean that the economy of the region and state will grow faster. Overall, we expect the estimates above to be optimistic but reasonable.

## 8-Other Community Impacts

MU's medical school is involved in a variety of activities that contribute to the quality of life of residents of the local community. These activities range from health care services to educational programs. The clinical campus in Springfield is likely to allow MU's medical school to expand its service area in the Southwest portion of the state.

**MU medical school's community health activities have the following objectives:**

- Establish a stronger community-campus partnership;
- Assist the communities to better serve their citizens;
- Discover the health and quality of life concerns within the community;
- Promote medical student understanding of the social and public purpose of the profession;
- Promote the ethic of service as an integral part of professional practice;
- Give students greater responsibility for their learning; and
- Impact local issues and local needs.

One of the programs administered by MU's medical school is the MedZou community health clinic. MedZou is a student-coordinated effort to provide health care access to the more than 20 thousand uninsured persons in Boone County. The clinic is operated primarily by students and provides free primary health care to residents of Boone County. Moreover, the clinic is used to educate patients with chronic health issues. The clinic provides a benefit to the medical students, who gain experience by working with the underserved members of the community. This partnership provides a win-win scenario for the community and the students: the community benefits because uninsured individuals receive free health care services; the students gain invaluable experience.

A second community-oriented program of MU's medical school is the Community Integration Program (CIP), which is part of the school's rural track pipeline program. CIP is integrated into the clerkship for third year medical students. By participating in community service projects, students develop an understanding of rural culture and quality of life and practice the ethic of service as an integral part of professional practice.

The third community-oriented program overseen by MU's medical school is the Area Health Education Centers (AHEC). AHEC is an educationally oriented outreach program to rural and underserved portions of Missouri. MU's medical school works with both large- and small-scale health systems in Southwest Missouri to send students to the region for training. Successful programs, such as MU's AHEC program, have proven that students who train in rural and underserved areas are more likely to return to these areas to practice.



## 9-Summary and Conclusions

This study has examined the expected economic impacts if a new clinical campus of the MU School of Medicine were established in Springfield, Missouri. Clearly the most important impact of such a facility would be the increased number of physicians expected to practice in the Southwest region of the state. However, the program would also generate significant economic benefits for the Southwest region, the Mid-Missouri region and the state as a whole. These impacts would flow from three distinct sources. First, the construction of facilities would generate short-term and immediate impacts on the Mid-Missouri and Southwest Missouri regional economies. The construction anticipated in the Mid-Missouri region would add almost \$39 million to total business sales in the region and over 350 job-years over the duration of the project. In the Southwest region, construction would add over \$4 million in gross business sales and 42 job-years. Total impact at the state level from this phase is estimated to be \$56 million in gross business sales, almost \$27 million in gross state product and 476 job-years.

The second source of stimulation would come from the operational budget of the program. In the Mid-Missouri region, the program once fully operational would add over \$11 million to gross business sales and over \$6 million in labor income. About 93 permanent jobs would be created. In the Southwest region the impact of the program would be almost \$5 million in gross business sales, \$3.5 million in labor income and 105 permanent jobs. At the state level the impact is predicted to be almost \$18 million in gross sales, \$12 million in gross state product and 203 permanent jobs.

As the new medical students join and move through the program, another impact flows from their expenditure on living and educational expenses other than tuition. It is estimated that once the full complement of students is in place in the fourth year, the impacts on the Mid-Missouri and Southwest Missouri regions will be roughly the same: \$1.2 million in gross business sales, over \$3.5 million in local income, and about 12 permanent jobs in each region. The statewide impacts are estimated to be almost \$3 million in gross business sales, \$1.6 million in gross state product and 26 permanent jobs.

The fourth and largest source of economic stimulation will start in the 5<sup>th</sup> year when students complete their formal education and become residents, and later practicing physicians. We assume that eventually over 50 percent of the graduates will locate in the Southwest region. By about 2040, the contribution of the program will reach its maximum level, at which time 315 additional physicians will be practicing in the region because of the program. At this point, these physicians will be contributing over \$300 million to gross business sales, and over \$160 million to the region's income. Over 3,000 regional jobs will be attributable to their practices. At the state level, assuming no displacement of economic activity outside the Southwest region, gross business sales will be increased about \$370 million, gross state product by \$233 million and employment by 3,270. To put this impact in perspective, if the Missouri economy were to continue growing as it has for the last 15 years, by 2040 the state gross domestic product will be

roughly \$670 billion in today's dollars and the proposed clinical campus would be contributing roughly .03% of this state's production. On the other hand, comparing it to the current Springfield metropolitan area, this impact is approximately one quarter the size of the entire hospital and social services sector and roughly one half the size of Springfield's current accommodations and food services sector.

Given the growing demand for physicians, especially in medically underserved areas, programs such as this can make a significant contribution not only to the health and quality of life of residents but also to their short- and long-term economic prospects.

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## APPENDICES

<b>University of Missouri School of Medicine 2011-2012 Cost of Attendance</b>				
<b>Heading</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>
Tuition and Fees	\$26,436	\$26,436	\$29,408	\$29,236
Medical Resource Fee	\$1150	\$1150	\$1150	\$1150
Book and Supplies	\$2,400	\$1,020	\$930	\$560
Room and Board	\$9,954	\$9,954	\$9,954	\$9,954
Personal expenses and transportation	\$6,670	\$6,670	\$6,670	\$6,670
Health Insurance	\$2,400	\$2,400	\$2,400	\$2,400
Hepatitis B Vaccination	\$130			
UMSLE Test		\$526	\$1120	
USMLE step IICS Travel				\$574
<b>Total estimated expenses , MO resident</b>	<b>\$49,140</b>	<b>\$48,156</b>	<b>\$51,632</b>	<b>\$50,544</b>
Out-of-State Tuition	\$25,042	\$25,042	\$27,824	\$26,124
<b>Total estimated expenses , non- resident</b>	<b>\$74,182</b>	<b>\$73,198</b>	<b>\$79,456</b>	<b>\$76,668</b>

Source: University of Missouri School of Medicine

[Available: <http://medicine.missouri.edu/financial/docs/WEB%20Tuition%202011-2012.pdf>]

### Mid-Missouri Region Counties

Audrain	Cooper
Boone	Howard
Callaway	Moniteau
Cole	Randolph

### Southwest Missouri Region Counties

Barry	Hickory	Pulaski
Barton	Howell	St. Clair
Camden	Jasper	Stone
Cedar	Laclede	Taney
Christian	Lawrence	Texas
Dade	McDonald	Vernon
Dallas	Newton	Webster
Douglas	Ozark	Wright
Greene	Polk	

